भारतीय मानक
Indian Standard

IS 233 (Part 1) : 2021

वस्त्रादि — कपास रेशों की लंबाई प्राचलों के निर्धारण के लिए विधियां

भाग 1 सामान्य

(दूसरा पुनरीक्षण)

Textiles — Methods for Determination of Length Parameters of Cotton Fibres

Part 1 General

(Second Revision)

ICS 59.060.10

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भारतीय मानक ब्यूरो
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November 2021 **Price Group 2**

Physical Methods of Tests Sectional Committee, TXD 01

FOREWORD

This Indian Standard (Part 1) (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Physical Methods of Tests Sectional Committee had been approved by the Textiles Division Council.

This standard was first published in four parts in 1954 which covered methods for determination of various length parameters of cotton fibres using Ball (Sledge) Sorter Method, Ahmad-Nanjundayya Stapling Apparatus Method and Baer (Comb) Sorter Method. This standard was subsequently revised in 1978 to include two more methods (Part 5 and Part 6) namely, thickness scanning method (uster stapling apparatus) and optical scanning method (digital fibrograph). Later in year 1989 through an amendment No. 2, Ball (Sledge) Sorter Method (Part 3) and Ahmad-Nanjundayya Stapling Apparatus Method (Part 4) were deleted as these methods are not used commercially and accordingly, Part 5 and Part 6 were re-designated as Part 3 and Part 4 respectively.

This standard has been revised again to incorporate the following major changes:

a) Amendments issued have been incorporated;
b) Terms and definitions have been updated; and
c) References to Indian Standards have been updated.

This Indian Standard has been published in four parts. The other parts in the series are:

Part 2 Estimation of length and length distribution by the array method
Part 3 Estimation of length and length distribution by the thickness scanning method
Part 4 Estimation of length, uniformity ratio and uniformity index by the optical scanning method

The fibre length of cotton is directly related to its spinning performance; in general, longer cottons can be spun to finer counts. The method of estimating fibre length or ‘staple’ of cotton used in the trade has long been accepted to be liable to considerable subjective and personal errors, and the need for accurate methods of determining the mean fibre length of cotton and the proportion by weight of fibres of different length grades in cotton has long been recognized.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’.

Indian Standard

TEXTILES — METHODS FOR DETERMINATION OF LENGTH PARAMETERS OF COTTON FIBRES

PART 1 GENERAL

(Second Revision)

1 SCOPE

This standard (Part 1) gives general information, like terminology, sampling, precision of test results, etc regarding the methods for determination of length parameters of cotton fibres.

2 REFERENCES

The standard given below contains provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of this standard.

IS No.	*Title*
196 : 1966	Atmospheric conditions for testing (*revised*)

3 TERMS AND DEFINITIONS

For the purpose of this standard, the following definitions shall apply.

3.1 Coefficient of Variation of Length — The standard deviation of the weight - length or relative number-length frequencies expressed as a percentage of the mean length.

3.2 Effective Length — The upper quartile length of the distribution excluding fibres below half the upper quartile, and is obtained by prescribed geometric constructions on a cumulative length frequency diagram based on number.

3.3 Half-fall — The fibre length, higher than the modal length, having half the modal frequency (by weight).

3.4 Mean Length — The average length of all fibres in the sample, based on weight-length or relative number-length distribution.

3.5 Percent Short Fibre — The percentage of fibres less than half the effective length (or less than any specified length).

3.6 Span Length — The minimum length spanned by a specified percentage of the fibres in a randomly aligned representative tuft. Thus, 2.5 percent span length is the length exceeded by only 2.5 percent of the total number of fibres in the tuft; similarly, 50 percent span length is the length exceeded by only 50 percent of the fibres.

3.7 Uniformity Index — It is the ratio of mean length to upper half mean length (UHML). Uniformity Index is calculated as follows:

$$\text{Uniformity index} = \frac{\text{Mean length}}{\text{Upper half mean length}} \times 100$$

3.8 Uniformity Ratio — The ratio between two span lengths expressed as a percentage of the longer length. Uniformity ratio is calculated as follows:

$$\text{Uniformity ratio} = \frac{\text{50 percent span length}}{\text{2.5 percent span length}} \times 100$$

3.9 Upper Half Mean Length — Upper half mean length (UHML) is the mean length by the number of fibres in the largest half by weight of fibres in a cotton sample, usually measured from the fibrogram. Upper half mean length (UHML) is normally equivalent to the staple length.

3.10 Upper Quartile Length — The length which is exceeded by 25 percent of the fibres, by weight or number, in the sample.

4 ATMOSPHERE FOR CONDITIONING AND TESTING

The atmospheric conditions are not critical for fibre length measurements, however, to reduce difficulties in fibre handling and to provide uniform ambient conditions for electronic instruments used for testing, standard atmosphere of relative humidity 65 ± 2 percent and temperature of 27 ± 2 °C as specified in IS 196 is recommended.

5 SAMPLING

5.1 Laboratory Sample from Small Bulk (Up to 10 kg) — The loose raw cotton is spread out in an even layer, and about 200 tufts, each of about 0.5 g, are picked up at random to form the laboratory sample. For convenience, the bulk may be divided into a number of equal portions, and equal number of tufts drawn from each portion to comprise, in all, about 200 tufts.

5.1.1 *Representative Sliver from Laboratory Sample* — The laboratory sample is divided into 20 to 30 approximately equal parts, and a small tuft of fibres is extracted from each part at random to constitute a total mass of about 300 mg. These are cleaned, disentangled and somewhat parallelized by hand, and joined together to form a hand-made sliver, which is then passed about 10 times through a draw-box, having a draft of 4, to obtain a well-mixed sliver in which the fibres are reasonably parallel to one another This shall constitute the test sample.

6 PRECISION OF TEST RESULTS

In all the test methods the precision of the estimates depends upon a number of factors including the nature of the cotton, tuft to tuft variation, variation within tufts, and the operators' skill. The estimates of error given provide only broad guidelines.

6.1 Array Method — Effective length, mean length, and percent short fibre estimated from the average of two tests have precision of about ± 4 percent, ± 6 percent and ± 4 percent respectively.

6.2 Thickness Scanning Method — The length parameters obtained on this apparatus have generally the same levels of precision as the comb sorter results (*see* **6.1**).

6.3 Optical Scanning Method — The length parameters obtained on this equipment have precision of about ± 0.5 percent for 2.5 percent span length and 50 percent span length and about ± 1 percent for uniformity ratio. The precision, in HVI mode, for mean length and upper half mean length for short/medium staple cotton (saw ginned) is about ± 0.38 mm and for long staple cotton (roller ginned) is about ± 0.46 mm. The precision, in HVI mode, for uniformity index for short/medium staple cotton (saw ginned) is about ± 1 percent and for long staple cotton (roller ginned) is about ± 1.2 percent.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Physical Methods of Test Sectional Committee, TXD 01

Organization	*Representative(s)*
ICAR-Central Institute for Research on Cotton Technology, Mumbai	Dr Pradeep Mandhyan (***Chairman)***
Bidhata Industries Pvt Ltd, Mumbai	Shri R. K. Pacheriwala Shri Rohit Pacheriwala (*Alternate*)
Central Silk Technological Research Institute, Bengaluru	Dr Subhas V. Naik Dr Prakash Bhat (*Alternate*)
Delta Ropes Mfg Co, Kolkata	Shri Anand Majaria Shri Aayush Majaria (*Alternate*)
Directorate General of Quality Assurance, Ministry of Defence, New Delhi	Shri R. K. Boruah Shri S. S. Kashyap (*Alternate*)
Garware Technical Fibres Limited, Pune	Shri Kishor Darda Shri Sachin Kulkarni (*Alternate*)
ICAR-Central Institute for Research on Cotton Technology, Mumbai	Dr T. Senthilkumar Dr Arputharaj A. (*Alternate*)
Indian Institute of Technology, New Delhi	Prof R. S. Rengasamy Prof Apurba Das (*Alternate*)
Indian Jute Industries Research Association, Kolkata	Ms Saumita Choudhury Shri D. P. Gon (*Alternate*)
Indian Jute Mills Association, Kolkata	Shri S. K. Chandra Shri J. K. Behera (*Alternate* I) Shri Rama Shankar Upadhyay (*Alternate* II)
Intertek India Pvt Ltd, Mumbai	Shri Narayan B. Borade Shri Hemant Parab (*Alternate*)
Kusumgar Corporates, Mumbai	Shri Yogesh Kusumgar Dr M. K. Talukdar (*Alternate*)
MSME-Technology Development Centre (PPDC), Meerut	Shri Ved P. Sharma
North India Textile Research Association, Ghaziabad	Shri Sanjeev Shukla Shrimati Nasrah Himayat Kidwai (*Alternate*)
Office of Jute Commissioner, Kolkata	Shri Somyadipta Datta Shri Mahadeb Dutta (*Alternate*)
Office of Textile Commissioner, Mumbai	Shri Sivakumar S. Shri N. K. Singh (*Alternate*)
SGS India Pvt Ltd, Chennai	Dr Karthikeyan K. Shrimati Anitha Jeyaraj (*Alternate*)
Testtex India Laboratories Pvt Ltd, Mumbai	Shrimati Meeta Shingala Shri Mahesh Sharma (*Alternate*)
Texanlab Laboratories Pvt Ltd, Navi Mumbai	Shri Harit Sardana Shri Vivek Patil (*Alternate*)
Textiles Committee, Mumbai	Shri Kartikay Dhanda Dr P. Ravichandran (*Alternate*)

Organization	*Representative(s)*
Thanawala and Co, Mumbai	Shri Hemal Thanawala Shri Upendera Thanawala (*Alternate*)
The Arvind Mills Limited, Ahmedabad	Shri Narendra Kajale Shrimati Mamta Chaudhary (*Alternate*)
The Bombay Textile Research Association, Mumbai	Shri R. A. Shaikh Shrimati Pragti Kulkarni (*Alternate*)
The Synthetic and Art Silk Mills' Research Association, Mumbai	Dr Manisha Mathur Shrimati A. A. Sudam (*Alternate*)
Tirupati Technik, Mumbai	Shri Vishal Masand
TUV Rheinland (India) Pvt Ltd, Gurugram	Dr P. S. Sundaram Shri Shivendra Parmar (*Alternate*)
Uster Technologies India Pvt Ltd, Mumbai	Shri Jagdish Kulkarni
VJTI, Mumbai	Dr Suranjana Gangopadhyay Dr S. P. Borkar (*Alternate*)
Wool Research Association, Thane	Shrimati Seema Patel Shri Mayur Basuk (*Alternate*)
World Traders Manufacturing Co, Mumbai	Shri Varun Gupta Shri Aditya Gupta (*Alternate*)
In personal capacity (*B-21, Parijat, Talepakhadi, Eskar Road, Borivali, Mumbai-400091*)	Dr R. P. Nachane
BIS Directorate General	Shri A. K. Bera, Scientist 'F' and Head (TXD) [Representing Director General (*Ex-Officio*)]

Member Secretary

Shri J. K. Gupta
Scientist 'E' (TXD), BIS

Bureau of Indian Standards

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Amendments Issued Since Publication

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